Poster Lisa Storrie-Lombardi

SIRTF FIRST LOOK SURVEY

Overview of the First Look Survey

SIRTF

- **What:** A survey to characterize the sky at the sensitivity levels easily achieved by SIRTF, to aid the first wave of observers
  - *Target of 100 hours of Director's Discretionary Time*
  - *3 components: Extragalactic, Galactic, & Solar System*
- **Why:** The loss of WIRE deprived the community of knowledge of the mid-infrared sky (esp. at 24 μm) at faint flux levels
  - *FLS recommended by Williams Committee*
- **When:** FLS observations to occur right after the observatory is commissioned. Data products to be publicly available as soon as they are deemed reliable.
  - *Survey plan must be robust against changes in launch date*
- **Who:** The SSC will lead the FLS effort, with Instrument Team involvement, and community input
  - *Community Workshop held in Sept. 1999*
- **Details:** "First Look Survey" link at http://sirtf.caltech.edu

FLS Extragalactic Component

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- Preliminary plan: map 5 sq.deg. with IRAC & MIPS at "shallow" level, roughly one minute per pixel on sky
  - *4 sq.deg within Constant Viewing Zone, in area of lowest cirrus near 17h15m+59d30m, where I(100μm)=1-2 MJy/sr*
  - *1 sq.deg location depends on sky visible at end of IOC:*
    - in near-CVZ area of low cirrus at 16h20+54d30' (ELAIS N1 field), where I(100 μ m)=0.4 MJy/sr (accessible from end of IOC to Sep 2002),
    - OR within CVZ if area above not accessible at start of science mission
- Within above area, a **verification** survey of ≤0.25 sq.deg, covered with much greater redundancy, with both IRAC & MIPS
- Ancillary data planned (will be available after processing):
  - *NOAO has committed to optical survey, to R(5σ)~25.5mag*
  - *Sloan has agreed to observe FLS fields (details to be worked out)*
  - *Proposal submitted for VLA survey at 1.4GHz to 5σ =90 micro-Jy*
  - *Options under study for near-IR survey to K~18mag*

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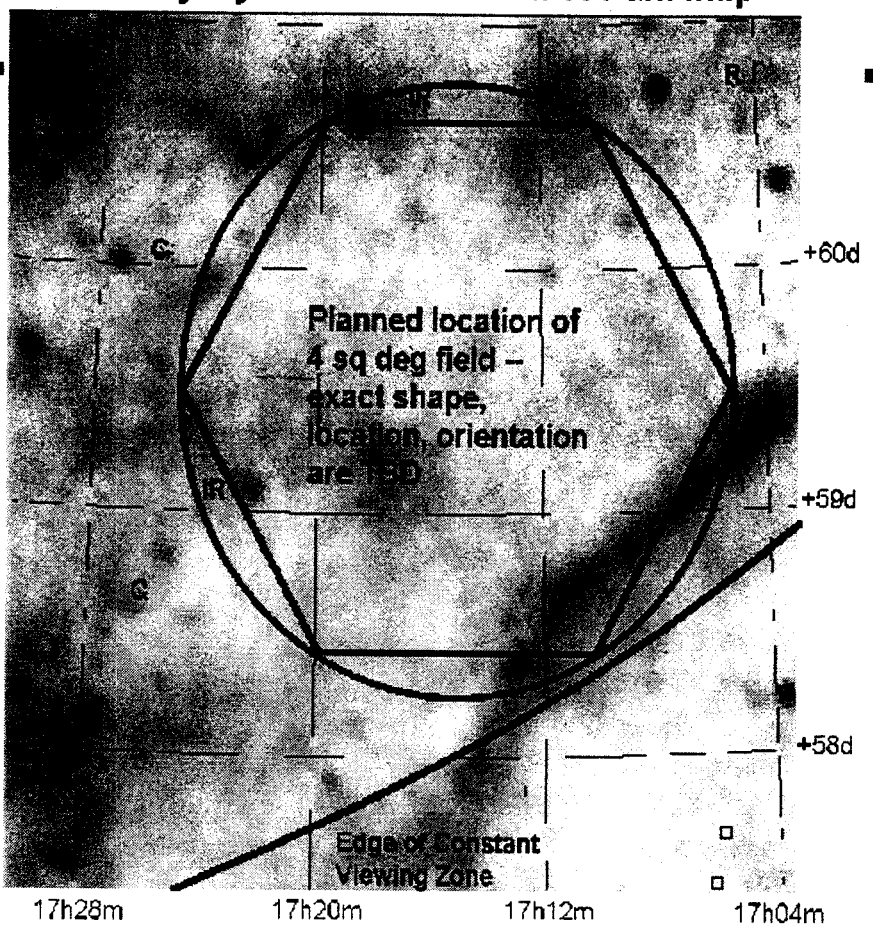
Preliminary layout of CVZ field on 100 um map



Legend:

R=Bright Radio Source

IR=Bright IR source (any IRAS band)

C=Calibrator Candidate

FLS Extragalactic Details

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- "Shallow" survey in MIPS scan-map with 5 passes at fast speed:
  - Total T(integration)= 75 seconds at 24 and 70μm. T(int)=15 sec at 160 μm
  - Depth reached is 1.3 mJy at 24 μm; confusion-limited at 160 μm
  - Rate=1deg^2 per 4 hours. Estimates for a 5 deg^2 , 20 hr survey:

Lambda	5-sigma	Gain/past	Src Count			
24	1.3 mJy	~100	~400			
70	4.5 mJy	~50	~1,500			
160	27.0 mJy	~8*	~2,500	* ISO covered a few sq deg		

- "Shallow" IRAC survey, four bands simultaneously:
  - T(integration) = 5× 12 sec per point; requires ~5hr per deg^2.
  - Estimates for 5 deg^2, 25 hour survey:

Lambda	5-sigma	Gain/past	Src Count	z(L* Ellip)		
3.6 & 4.5	0.04 mJy	>>1	stars+?	~1		
5.8	0.04 mJy	~1*	stars+?	~0.4	* ISO covered a few	
8.0	0.06 mJy	~1*	~1500	~0.3		sq arcmin

- Verification may use same, or more integration time per sighting

FLS Galactic Component

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- Plan: characterize cirrus and source counts at low Galactic latitudes in two strips, with IRAC and MIPS at "shallow" extragalactic level:
  - *At ℓ=285°, a strip 5' wide and running -30°<b<0°*
    - Fully sampled for -10°<b<0°, but partially filled in for -30°<b<-10°
  - *At ℓ=150°, a strip 5' wide and running 0°<b<10°*
  - *Strips can shift in longitude if launch delayed several months*
- One strip for characterizing cirrus and source counts toward molecular cloud
  - *A 5' by 2° strip through Cham II cloud centered at 12h50m-77d (available from Feb 01 2002 to Sep 18 2002)*
  - *Backup clouds in case of launch slip are under study*
  - *Same MIPS depth as in extragalactic plan, but 10x more time in IRAC*
- No pre-launch ancillary data recommended

FLS Solar System Component

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- Goal: Characterize the moving object population (number counts, diameters, scale heights), and characterize the zodiacal light
- 2 fields of 0.2 sq deg each
  - *one in the ecliptic and the other 10-15 degrees out of ecliptic*
  - *110-120 degrees solar elongation, pointing back towards the Earth*
  - *fields are independent of launch date, except avoid Galactic Plane*
- 3 passes with IRAC in each field to detect moving objects
  - *2-3 hours between each pass*
  - *0.06 mJy detection limit with IRAC (8.0 microns)*
- 1 wider area pass with MIPS to detect objects found by IRAC
  - *1.3 mJy detection limit for MIPS (24 microns)*
- In ecliptic, detect 108 asteroids with IRAC, 56 asteroids with MIPS, many with diameter less than 1 km
- Simultaneous ground-based visual observations required
  - *to V=25 if possible*